

Microgravity Electron Electric Dipole Moment Experiment with a Cold Atom Beam

Finding an electron electric dipole moment (EDM) would prove the existence of physics beyond the Standard Model because the Standard Model does not allow an EDM large enough to be experimentally observable. New atomic physics experiments - there are no high energy physics experiments that are sensitive to an (electron) EDM - may observe an electron EDM predicted by Supersymmetry. But finding no electron EDM would pose difficulties for Supersymmetry and possibly other models.

Electron EDM experiments share many attributes of atomic clocks including benefiting from cold atoms and microgravity. For cold atom beam experiments, microgravity provides longer observation time and reduces potential systematic effects due to the motion of the atoms. A feasibility study using ground based measurements in a model EDM experiment, now under construction, will be described. The improvements to sensitivity and immunity to systematic effects will be discussed. Finally, scenarios for a very sensitive microgravity beam EDM experiment will be presented.